

REMARKS

Claims 1-16 are pending.

The Examiner has not acknowledged Applicants' claim to foreign priority under 35 U.S.C. § 119(a)-(d) or receipt of the certified copy of the priority document.

Applicants' claim priority to JP 2003-127817, filed May 6, 2003. A certified copy of the priority document was filed with the U.S. Patent Office on April 19, 2004. Accordingly, Applicants respectfully request that the Examiner acknowledge Applicants' claim to foreign priority under 35 U.S.C. § 119(a)-(d) and receipt of the certified copy of the priority document.

Claims 8-16 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claim 1 of U.S. Patent No. 6,709,590 and U.S. Patent No. 6,723,422 and claims 3 and 4 of co-pending application 11/242,049.

Applicants traverse the rejection.

Claim 1 of U.S. Patent No. 6,709,590 is directed to a reverse osmosis membrane comprising a polyamide layer formed on a porous support, wherein the polyamide layer is formed by reacting a polyfunctional amine and a polyfunctional acid ingredient. However, claim 1 of U.S. Patent No. 6,709,590 does not recite that the polyfunctional amine ingredient and polyfunctional acid ingredient are reacted "in the presence of at least an alkali metal hydroxide and an organic acid."

Moreover, in claim 1 in U.S. Patent No. 6,709,590, the polyamide skin layer contains bromide therein. Specifically, in the invention described in U.S. Patent No. 6,709,590, an

aromatic polyamide skin layer is treated with free chlorides including bromide to form bromic acids, and then bromide atoms are added to the aromatic ring of the aromatic polyamide skin layer. On the other hand, in the claimed invention, a polyamide resin is not brominated.

Claim 1 of U.S. Patent No. 6,723,422 is directed to a reverse osmosis membrane comprising a polyamide layer formed on a porous support, the polyamide layer is formed by reacting a polyfunctional amine with a polyfunctional acid ingredient. Claim 1 of U.S. Patent No. 6,723,422 does not recite that the polyfunctional amine ingredient and polyfunctional acid ingredient are reacted “in the presence of at least an alkali metal hydroxide and an organic acid.”

Moreover, in claim 1 in U.S. Patent No. 6,723,422, the membrane is prepared by applying the amine solution A on the porous support, and applying the acid halide solution B thereon, and then applying the high-concentration acid halide solution C thereon. In the examples in U.S. Patent No. 6,723,422, the structure of the skin layer is changed through the process.

Claims 3 and 4 in co-pending application no. 11/242,049 are directed to a reverse osmosis membrane comprising a porous support having formed thereon a separation active membrane comprising a crosslinked polyamide polymer. Again, claims 3 and 4 (and claim 1 from which the claims ultimately depend) do not recite that a polyfunctional acid ingredient and a polyfunctional amine are reacted in the presence of an alkali metal hydroxide and an organic acid.

As discussed on pages 1 and 2 of Applicants' specification, reacting a polyfunctional amine and a polyfunctional acid in the presence of an alkali metal hydroxide and an organic acid

would not be an obvious variant of one of the processes disclosed in U.S. Patent No. 6,709,590, U.S. Patent No. 6,723,422, or co-pending application 11/242,049. Additionally, the claimed semipermeable membrane has a higher ability to reject salts and a higher permeation flux over the membranes disclosed in the prior art.

Applicants direct the Examiner's to compare Examples 1 to 6 and Comparative Examples 1 to 3 in the present specification (i.e., examples in which a polyfunctional acid ingredient and a polyfunctional amine are not reacted in the presence of alkali metal hydroxide or organic acid). Applicants submit that it is clear from this comparison that the composite semi-permeable membranes of claims 8 and 15 provide unexpectedly superior advantages in sodium chloride rejection, IPA rejection, and permeation flux. None of these advantages would be expected from any of the cited references.

In view of the foregoing, Applicants submit that the claimed invention would not be obvious over claim 1 of U.S. Patent No. 6,709,590 and U.S. Patent No. 6,723,422 and claims 3 and 4 of co-pending application 11/242,049.

Claims 1-5 and 7-16 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by WO 99/01208 to Hirose (the Examiner is citing to U.S. Patent No. 6,723,422, the U.S. equivalent of WO 99/01208).

Hirose discloses a method of producing a composite reverse osmosis membrane in which a layer is formed on a porous support by coating the support with a solution A (comprising one or more polyfunctional amines) (col. 2, lines 42-47). Then, this layer is contacted with solution B (comprising one or more polyfunctional acid halide compounds) and further contacted with

solution C (comprising polyfunctional acid halide compounds) (col. 2, lines 48-54). In Hirose, the porous support provided with the layer is further contacted with at least either an acidic aqueous solution or an alkaline aqueous solution (col. 4, lines 13-21) (emphasis added).

The process in claim 1 is directed to a process for producing a composite semipermeable membrane which comprises forming on a surface of a porous supporting film a thin film comprising a polyamide resin obtained by reacting a polyfunctional amine ingredient with a polyfunctional acid ingredient in the presence of at least an alkali metal hydroxide and an organic acid (emphasis added).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Hirose discloses that the porous support may be contacted with an acidic aqueous solution or an alkaline aqueous solution. However, Hirose does not disclose the reaction of a polyfunctional amine ingredient with a polyfunctional acid ingredient in the presence of an alkali metal hydroxide and an organic acid. Therefore with respect to claim 1, Applicants submit that Hirose does not anticipate the claimed invention because Hirose does not disclose all of the claimed elements.

With respect to claim 8, Applicants submit that the composite semipermeable membrane produced by the process recited in claim 8 is not obvious over the composite membrane disclosed in Hirose. In this respect, Applicants direct the Examiner's to compare Examples 1 to 6 and Comparative Examples 1 to 3 in the present specification (i.e., examples in which a polyfunctional acid ingredient and a polyfunctional amine are not reacted in the presence of alkali metal hydroxide or organic acid). Applicants submit that it is clear from this comparison

that the composite semi-permeable membrane of claims 8 and 15 provide unexpectedly superior advantages in sodium chloride rejection, IPA rejection, and permeation flux. None of these advantages would be expected from the composite membrane disclosed in Hirose.

In view of the foregoing, Applicants submit that Hirose does not anticipate or render obvious the claimed invention. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1-16 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Tomaschke, U.S. Patent No. 6,464,873.

Tomaschke discloses a process of producing a water permeable membrane comprising coating a microporous support with an aqueous solution comprising (i) an essentially monomeric bipiperidine reactant of formula (I) with or without (ii) a monomeric amine salt to form a liquid layer. This liquid layer is then contacted with an organic solvent solution of an essentially monomeric amine-reactive reactant comprising a polyfunctional aromatic or cycloaliphatic acyl halide, or a mixture thereof (col. 4, lines 16-31).

In Example 1 in Tomaschke, an unsubstituted 4,4'-bipiperidine isolated from its supplied dihydrochloride salt form, TEACSA (salt of triethylamine and camphorsulfonic acid), and sodium lauryl sulfate (SLS) were combined and diluted with 10L deionized water. The pH of the resultant solution was adjusted to approximately 12.75 by addition of sodium hydroxide (col. 9, lines 37-67).

In Example 1 in Tomaschke, in a first step, an aqueous solution of a polyfunctional amine is coated on a substrate. Then, in a second step, the substrate (with the coating) is contacted with

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Response under 37 C.F.R. § 1.111

a polyfunctional acid to form a water permeable membrane. This is different from the present invention, which produces a semi-permeable membrane, in which a polyfunctional acid, a polyfunctional amine, an organic acid, and an alkali metal hydroxide are all reacted together to form an aqueous solution that is then coated on a porous supporting film.

In view of the foregoing, Applicants submit that the process of Tomaschke is different from and would not anticipate the claimed process. Reconsideration and withdrawal of the rejection are respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

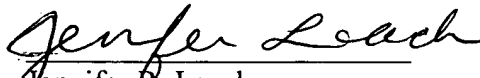
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